

## REMARKS

In pages 2 through 4 of the last office action, there were numerous objections to the format and structuring of the claims. It is believed that with the submission of the new claims by this amendment, these various objections have been remedied.

Also, it is noted that on the top of page 3 in the last office action, it was stated that upon reconsideration Claims 1 and 4, 9 will be examined on the merits to the extent that they pertain to a method of obtaining a propionic acid bacterial food preparation in various forms. The claims presently submitted in the application are directed to this method.

It is believed that a clearer understanding of the present invention will be obtained by first discussing somewhat generally some background information and some aspects of what is known in the prior art relative to the use of propionibacteria for various purposes. This will be followed by a summary of the basic features of the present invention, followed by further discussion of the claims and also the unexpected results accomplished by the present invention.

To review some of the background information presented in the text of the above patent application, on page 1, it is first stated that for years nutrition specialists have recommended a diet rich in fibers which have the effect of being beneficial to a person's health. The dietary fibers in general resist to the digestive enzymes of the small intestine and they pass into the colon where they are degraded and assimilated. It is also known that the fermentation of the fibers in the colon culminate in the production of short chain fatty acids, hydrogen, carbon dioxide and biomass. The fatty acids which are developed are essentially acetic acid, propionic acid and butyric acid. It is also pointed out in the text on page one of the application that

different studies have proved the importance of these short chain fatty acids which are beneficial to health.

With regard to propionibacteria, it is also known in the prior art that propionibacteria can be used in some ways so as to be a benefit to a person's health, and two items are mentioned in the last office action. In PCT Application WO9719689 there is disclosed the use of propionibacteria by a person or mammal orally ingesting the propionibacteria to have the effect of stimulating bifid bacteria in the person's digestive system for improving the biological balance of the intestinal flora. One of the main effects of this is to reduce the emission of malodorous gases by the human or other mammal that is ingesting the propionibacteria.

In the PCT Publication WO9827991 there is disclosed an absorbable composition containing propionibacteria which is capable of releasing nitrogen monoxide in the human or animal digestive tract.

Neither of these suggest the method of the present invention.

The concept underlying the present invention is to generate short chain fatty acids, in particular propionic acid, in situ in the colon of a human or other mammal by anaerobic bacterial fermentation with the presence of a fermentescible substrate, in particular dietary fibers, under action of micro-organisms able to produce significant quantities of propionic acid at the colon.

However, in order to obtain this effect it is necessary to find a manner in which the propionibacteria could safely reach the colon of the person or other mammal. When the propionibacteria is orally ingested by the person, it is subjected first to the acid stress in the person's stomach which weakens the propionibacteria and in large part makes these incapable of

resisting the bile stress in the small intestines which can lead to nearly total mortality of these bacteria.

Prior to the conception of the present invention, it was simply not known in the prior art how the ingested propionibacteria can reach the colon of the person or other mammal while remaining viable and producing in situ sufficient quantity of propionic acid by anaerobic bacteria fermentation to obtain a substantial benefit of secreting the short chain fatty acids, primarily propionic acid.

Accordingly, the present invention provides a method of providing a food supplement or food product which is adapted to stimulate and/or increase the production of short chain fatty acids and namely propionic acid, in the colon of the human or other animal, selecting suitable strains.

In general the selection procedure involves for each strain of propionibacteria being subjected to a bile environment (e.g. 0.6% bovine bile) for a period of time (e.g. ninety minutes). If bacteria are then able to produce a high amount of propionic acid then the strain is suitable for the invention.

From a plurality of strains of propionibacteria, the selection procedure comprises for each strain or strains the following steps:

- i. subjecting a predetermined quantity of bacteria of each of said strains to stress in a bile environment of a predetermined strength for a predetermined period or periods of time;
- ii. incubating the stressed propionibacteria of each of said strains for a predetermined period or periods of time to provide a yield of propionic acid and/or propionates;

- iii. selecting as selected strain or strains one or more of said strains which have a yield of propionic acid and/or propionates at or above a selected level of yield.

Then these selected strain or strains are used as a food supplement or product by incorporating these strains in the food supplement or product. The food supplement or product could contain a fermentable substrate, which in a preferred form could be dietary fibers. To obtain the effect which is sought, the propionic acid has to be generated in sufficient quantity.

Subsequent to the filing of the original patent application upon which the present U.S. patent application is based, additional experimental work was done in evaluating the method of the present invention. These experiments demonstrate that with the present invention the selected propionibacteria produced significant quantities of propionic acid and the results can be summarized as follows:

- the propionibacteria reach the colon remaining viable in sufficient quantity after having successfully undergone the two main stresses they are subjected to, which is the acid stress and the bile stress and in addition:
- the propionibacteria produce the propionic acid in sufficient quantity in situ in the colon in spite of the fact that the propionic bacteria ingested are submitted to unfavorable conditions, such as the competition with a significant quantity of endogenous bacteria whose interactions might fundamentally modify their own activity.

As part of the present invention there is a basic acceptable standard established by which the strain or strains of propionibacteria can be

evaluated as being acceptable for use in the method of the present invention. This is a seven step process which is presented in Claim 27.

These matters were discussed with Mrs. Lepley, PhD, just shortly before submitting this response, and it was verified that the above mentioned further experiments verified that the bacteria selected by the method of the present invention would actually per single bacterium have a relatively greater than expected production of the propionic acid. This was truly an unexpected result.

Further, Mrs. Lepley, was asked by the undersigned how many strains of the bacteria were selected and then tested in developing the present invention and how many were selected. Mrs. Lepley explained this to me as follows. The research team which she is a part of is one of a number of teams in the world which is focused on propionibacteria. Such other teams are mostly located in Northern Europe (Finland, Sweden), Japan, Australia and Chili. The research team of which she is a part has collected many strains from different parts of the world for over twelve years, and presently has a global collection of about 600 different strains. It would not be economically feasible to perform thorough testing of 600 different strains. Accordingly, about 100 of those strains having characteristics that would have a higher expectation relative to this specific application (short chain fatty acid production) were selected for testing. And these were passed through the selection procedure as described in earlier in these remarks. The result was that only twenty strains passed the basic acceptability standard test, which represents 20% of the strains actually tested and 3-1/3% of the strains available. She also pointed out that there were a fair number of strains that would produce rather large quantities of propionic acid if simply placed in a normal growing

environment, but when being used in the selection process described in the present invention would turn out to be ineffective.

Mrs. Lepley is in the process of preparing, in cooperation with the undersigned, the material for a supporting declaration to document various facets of the present invention. However, with Mrs. Lepley's current travel schedule in Europe, the declaration is not yet completed. It is the intention of the undersigned to submit this shortly by a supplemental response.

A truly surprising or unexpected aspect of the present invention is that not only is it possible to achieve the goals of the present invention (i.e. the placing of the propionibacteria in sufficient quantity in the colon to obtain a satisfactory production of propionic acid) but that in doing so the per bacteria output of the propionic acid is beyond which would have been expected. It is also important to note that the approach taken by the present invention is in no way suggested by any of the prior art. To summarize, not only is the specific testing procedure of the present invention not suggested by any of the prior art, but the fact that the selection process enables the unexpected results of the present invention to be accomplished is nowhere suggested in the prior art.

Also by utilizing the present invention, the desired end product could be provided much more economically.

If there is any matter which could be expedited by consultation with the Applicant's attorney, such would be welcome. The Applicant's undersigned attorney can normally be reached at the telephone number set forth below.

Signed at Bellingham, County of Whatcom, State of Washington this October 14, 2004.

Respectfully submitted,



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